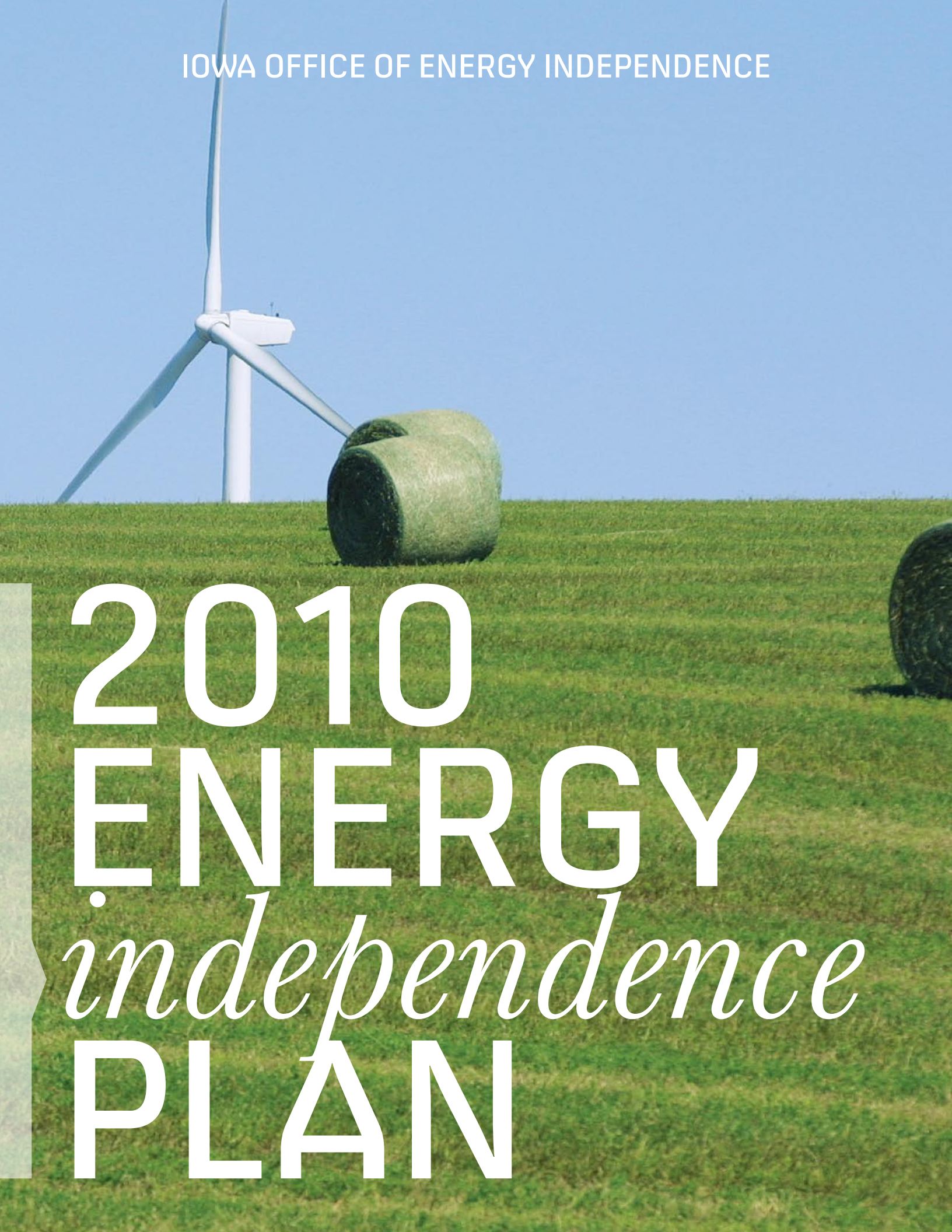
IOWA OFFICE OF ENERGY INDEPENDENCE



2010 ENERGY *independence* PLAN

GOVERNOR AND LT. GOVERNOR MESSAGE

In Iowa we share a bond through our commitment to education, community, family and a strong work ethic. This shared commitment allows us to lead in what we do well – and in Iowa we do energy very well. Because we are in a period of historic change in the way energy is produced and used, we can ensure our successful future by making "Made in Iowa" energy synonymous with economic prosperity. We also want energy that carries the "Made in Iowa" name to be the most cost effective and environmental sustainable energy available for the nation.

By creating an irreversible momentum associated with our energy industry, we can ensure that the jobs we create are permanent Iowa jobs – jobs that can not be outsourced because they can only happen here. We can retain existing employers and grow new energy industry that not only fits our landscape; it becomes inextricably linked to Iowa.

The Iowa Power Fund plays a critical role in achieving this vision. One way that we can enhance our prosperity is through research and development, which contributes to innovations and new technologies that improve our standard of living and the quality of our lives. Since 2007, the Power Fund has invested $35 million directly in competitive projects. These projects are responsible for leveraging more than $190 million in energy research and development, early stage commercialization and education and information. Together with the Power Fund recipients, we have been able to create 2300 jobs

Broken Kettle Grasslands Preserve, Loess Hills. Plymouth County. ***Photo by Clay Smith, Iowa DNR.***

through these investments. An additional $14.75 million in Power Fund dollars have been provided for community college energy curriculum enhancement and flood recovery. The creation of the Office of Energy Independence to manage this fund and provide leadership on energy policy and programs has allowed the state to engage collaboratively and help Iowa's collective effort to achieve tangible results.

The recommendations in this plan will require continued collaborative work with Iowans who are committed and passionate about achieving this vision of prosperity. Taken together, the recommended actions will allow Iowa to further develop our strengths in the biofuels and renewable energy industries, while creating new jobs and making energy efficiency a top priority.

Chester J.Culver, GOVERNOR OF IOWA
Patty Judge, LT. GOVERNOR

OEI DIRECTOR'S MESSAGE

IOWANS HAVE MUCH TO BE PROUD OF.

• The Green Plains Renewable Energy and Bioprocess Algae, LLC project in Shenandoah, which uses algae as an affordable feedstock for the biofuels industry

• The Clean Gasification Platform for Renewable Power project at Iowa State University that is developing methods of creating more efficient gas and syngas burners and technology to produce ethanol from synthesis gas

• The Iowa Alliance for Wind Innovation and Novel Development at the University of Iowa where they are implementing research and training components for large-scale gearbox testing facilities to support the continued growth of turbine component manufacturing

• The development of less expensive solar cells based on dye sensitized solar cell technology at the University of Northern Iowa

• The TPI advanced wind blade manufacturing initiative in Newton to foster the mass production of wind turbines – Newton was a site chosen by President Obama to address the nation on clean energy and highlight as an example of helping to lead the next energy revolution and the list goes on.

Publishing this annual Energy Independence Plan for Iowa allows us to share the progress Iowa has made and the actions we must take to achieve our vision for bold transformation in our energy choices. We willingly embrace the role of innovator and agent of change. At the same time we must also recognize the need to focus our efforts on capitalizing on the fundamentals of what makes Iowa great.

With all of the discussion of research, technical innovation and economic transformation, we can sometimes lose touch with the basic reason we do what we do. The actions we call for in this Plan are a technical examination of what it will take for Iowa to meet its long term energy goals. At their core, they have just one vision in mind. We want to live in a healthy place where our families and friends have rewarding and prosperous careers, comfortable places to reside, clean air and water, and abundant opportunities for the future.

The Office of Energy Independence took a multi-faceted approach to identifying the key actions for this report. We drew upon the feedback of our partners in the state's utilities, renewable energy and biofuels industries, educational institutions, environmental organizations and communities. Our thinking was also guided and informed by the Iowa Power Fund Board; ideas raised by this diverse and committed group encouraged the continued commitment to forthright action.

Ultimately, we recognize that success in achieving these actions is essential to achieving the vision for Iowa that we all share, and we invite your continued contribution to the results.

Roya Stanley, DIRECTOR
OFFICE OF ENERGY INDEPENDENCE

IOWA POWER FUND BOARD CHAIR

Iowa's Power Fund Board is comprised of professionals who are highly committed to Iowa's success and economic prosperity. We voluntarily take on the rewarding task of using our skills, knowledge and experience to ensure that the Iowa Power Fund makes awards to projects that support Iowa's economy through local investment and job creation, that enhance Iowa's intellectual infrastructure through sound research and development, and that brighten Iowa's future through effective energy education.

At a recent meeting of Power Fund Board members, we began discussing the strategic direction for Iowa's energy future, and we asked this question of ourselves: "What is your vision for Iowa?" This exercise was extremely helpful in setting the stage for the 2010 Energy Independence Plan. As the Board reflected upon Iowa's energy industry growth and what was important to us as people who live and work in this state, we learned that the Power Fund Board's vision for Iowa included:

"I want to be able to drive my car around the state with the satisfaction that I am not hurting the environment"

"I want my children to have the option of living in their own green home"

"Iowa should lead the country in the use of clean biofuels"

"Iowa's electricity should be the greenest in the U.S."

"When people think of Iowa, I want them to know Iowa as the clean energy state"

"My children should want to stay in Iowa because there are good paying green collar jobs here"

The recommendations in this Plan are shared by the Power Fund Board and are an important part of achieving the vision for Iowa that we all hold dear. All of these visions are really about the future for our children and grandchildren. They all require us to change and making changes such as these requires dedicated commitment and a lot of hard work. That is why some of us get up at 4:30 in the morning or get home at 8:00 in the evening from meetings and volunteer our time to serve on the Iowa Power Fund board.

We see a vision of a better future in Iowa and we are working toward it.

Thomas Wind, CHAIR
IOWA POWER FUND BOARD

Using organic materials, one-inch plastic solar cells are being produced in the Organic Semi-conductor lab at Iowa State University and Microelectronics Research Center. This Power Fund project would allow solar energy to become more cost-competitive with other forms of energy and would help to spur economic development in the solar energy sector. ***Photo by Don Tormey.***

EXECUTIVE SUMMARY

Iowans today operate in a world of change. From evolving economic conditions to environmental issues and demographic trends in our communities, we live and work in an atmosphere that constantly challenges us to think anew about our future. In Iowa, we are doing more than embracing these changes – we are seeking them. As a state focused on being the hub of investment and innovation for a new clean energy economy, our long term success depends on us staying ahead of these transformative waves. We do this all with attention to ensuring that we are investing in the right work to guarantee Iowa remains relevant, vibrant and connected to our vision for the next quarter of a century, not just the next quarter.

Iowa's efforts on energy efficiency and support of clean energy technologies are an important part of our economic and environmental prosperity strategies.

OUR SUCCESS RELIES ON:

- *Ensuring that Iowa establishes the physical and intellectual infrastructure necessary to lead in a new clean energy economy*
- *Aggressively expanding energy efficiency results*
- *Increasing renewable power generation and use, including distributed generation*
- *Fulfilling our state's remaining needs through the cleanest and most efficient traditional generation sources.*

The 2010 Energy Independence Plan provides a framework of long term goals, defined more specifically by targets and actions that will help us measure progress toward leadership in a prosperous new energy economy.

1. OPTIMIZE ENERGY USE IN IOWA

- *Target a 30% reduction in energy use in facilities in Iowa by 2025, reducing energy consumption through wise energy investments.*
- *Target a 10% decrease in vehicle miles traveled by promoting smart growth strategies and distributed workplaces.*

2. FULLY DEVELOP IOWA'S RENEWABLE ENERGY POTENTIAL

- *Target an increase in Iowa's wind energy consumption to 30% while also increasing wind energy generation to fulfill Iowa's contribution to the Department of Energy's National Wind Power Goal by 2020.*

3. MAXIMIZE THE DEVELOPMENT AND USE OF ECONOMICALLY AND ENVIRONMENTALLY SUSTAINABLE LOW CARBON FUELS.

- *Target an increase in Iowans' use of Iowa produced biofuels at 50% by 2025.*
- *Target environmental risk reduction in Iowa's biofuels industry to meet future low carbon standards.*

This document give Iowans specific recommendations for actions to take in the next year, and within the next five years, to make strides to achieve these goals and targets. The specific actions outlined here owe much to the Iowa citizens, utility executives, renewable energy industry professionals, environmental groups, community leaders, and others who attended the Office of Energy Independence stakeholder meetings to provide feedback and perspective on what they believe it will take for Iowa to achieve our vision for a prosperous Iowa and our obligation to a clean environment.

ENERGY, ENVIRONMENT & ECONOMY

Environmental issues and climate change are emerging as one of the most important economic and social issues of our day. Energy is at the forefront of this issue.

The Office of Energy Independence's focus on energy leadership requires us to be involved in directing the state toward opportunities to create economic benefit as we work to reduce environmental impact. Actions that will allow us to enhance our economy while protecting our environment include:

1. *Putting energy efficiency first.*
2. *Facilitating the deployment of clean distributed generation.*
3. *Increasing use of renewable energy and biofuels.*

Wind turbines in Dickinson County, near the Freda Haffner Preserve. *Photo by Clay Smith, Iowa DNR.*

2009 HIGHLIGHTS

• To date, the *Power Fund* has received 227 applications, requesting more than $479 million, with the potential to leverage more than $1.5 billion.

The Power Fund has funded 27 projects worth $35.3 million, leveraging more than $190 million.

• Through *Executive Order Six,* the Green Government initiative has completed an audit of every state agency on their current policies and practices related to purchasing sustainable materials, make state buildings more energy efficient, and promoting the use of biofuels in state vehicles. With this audit a baseline of data was established to measure progress of the Initiative.

Many state agencies have initiative projects which will result in energy savings. Of particular note, the state capitol complex reduced energy consumption by 6.5% in the past year.

• *The Iowa Clean Cities Coalition* developed a new website to educate Iowans about clean transportation technologies.

• *The Commission on Energy Efficiency Standards and Practices* was established by the legislature in 2008. The Commission is charged with developing recommendations regarding energy efficiency building codes, code enforcement, and a statewide building rating system. Recommendations will be submitted January 2011.

• *Executive Order 16* established the Green Jobs Task Force to coordinate the state's efforts to create and retain green jobs in Iowa. It also lays out plans for the state to apply for federal funding for green jobs.

• *Iowa's Leadership Positions:*

GOVERNORS' WIND ENERGY COALITION– Governor Culver is the Chair of the Coalition

GOVERNORS' BIOFUELS COALITION– Governor Culver becomes Chair of the Coalition in January 2010.

NATIONAL ASSOCIATION OF STATE ENERGY OFFICIALS– Director Stanley elected to the Board of Directors

ENERGY FINANCE ACT

It is no secret that energy improvements will help homeowners and businesses save money and stabilize their utility bills. In addition, energy improvements will help communities create jobs and improve their economies. In order to optimize these efforts, the Office of Energy Independence will work to develop opportunities for individuals and businesses to choose from a comprehensive menu of options to finance these improvements through the Energy Finance Act of 2010.

Making energy improvements has always been a good idea but there have been barriers that have limited the ability of individuals and businesses to implement these improvements. The transaction time for implementing energy efficiency can be high and lack of readily available technical and financial assistance can discourage people from taking action. While utility rebates assist in buying down the cost of energy improvements, many people do not have easy access to the remainder of the funds necessary to make the investment. Additionally, because the energy savings benefit accrues to the person paying the utility bill, investments in energy efficiency may be hampered in situations where people rent or have plans to move from a property in a shorter period of time.

The Energy Finance Act of 2010 will solve these problems by allowing communities to choose from a comprehensive menu of options to allow their local citizens and businesses to finance energy improvements. The act seeks to allow for financing that stays with the property and is repaid via an additional charge on a property tax bill or local utility bill. The savings achieved on their utility bill will provide the capital necessary to pay for the improvements through one of these options.

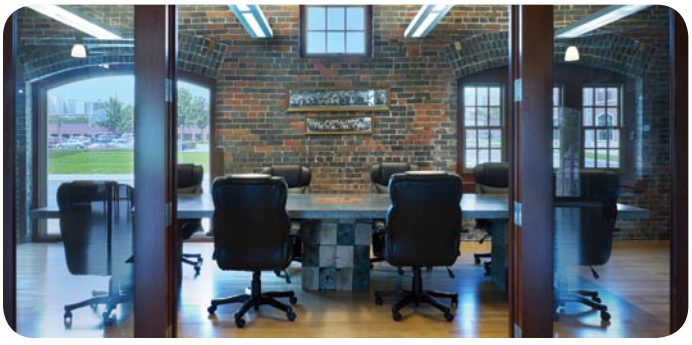
Downtown 2nd Avenue in Newton reflects many main street scenes of older buildings in Iowa, where investments in energy efficiency can help maximize energy use while saving money for consumers and businesses. ***Photo by Don Tormey.***

ENERGY EFFICIENCY GOAL
OPTIMIZE ENERGY USE IN IOWA

At a time when job creation and driving economic prosperity are foremost in people's minds, it makes sense to invest heavily in energy efficiency. Iowa's utilities have met aggressive energy efficiency targets, and the state has led in investments in public sector energy efficiency. Even with this laudable record of results, there continue to be opportunities to have an even greater impact. Today, many organizations own pieces of the solution that will drive swift and substantial investment in energy efficiency. When utilities, state agencies, building owners, community organizations, financial institutions, technical energy experts and others join together to achieve the following strategies the impact on Iowa's economy and environment will be amplified.

THE OFFICE OF ENERGY INDEPENDENCE RECOMMENDS THE FOLLOWING STRATEGIES TO MEET OUR GOAL:

- Establish a benchmark for energy efficiency improvement.
- Create increased partnerships with utilities, communities and other organizations in the state to create opportunities for increased investment in energy efficiency.
- Ensure that all Iowans have access to the upfront capital necessary for investments in energy efficiency.
- Develop state-wide, coordinated and more uniform core utility energy efficient programs.
- Communicate a state-wide energy efficiency message and call to action.
- Enforce the current building energy code statewide.
- Support the expansion of passenger rail and improved public transit in Iowa and throughout the Midwest.
- Reduce vehicle miles traveled and the environmental impact of transportation by supporting smart growth initiatives, idle reduction initiatives and by using communications technology.
- Establish community leadership capacity in the delivery of energy efficiency programs and develop and energy training and capacity building system for the state that is aligned among the various stakeholders groups.



IN THE NEXT YEAR, THE OFFICE OF ENERGY INDEPENDENCE RECOMMENDS THE FOLLOWING ACTIONS:

- Create and pass the Iowa Energy Finance Act in the 2010 legislative session. This act will authorize Iowa communities to provide access to the upfront financing necessary for investment in energy efficiency.
- Ensure that the state agencies lead by example in reducing energy consumption to meet the requirements of Governor Culver's Executive Order 6.
- Review the results of the studies completed by Investor Owned Utilities, Rural Electric Cooperatives and Municipal Utilities to understand the assessments of potential and program plans for each area. Using this information, coupled with other data, develop an energy efficiency goal for Iowa.
- Establish a utility energy efficiency committee that will include, but not limited to, the Iowa Utilities Board, the state's Investor Owned Utilities and the Consumer Advocate to investigate the best plan for decoupling that supports Iowans' interests.
- Establish energy use performance standard for all buildings.
- Develop a state-wide energy efficiency message and call to action that heightens Iowans' awareness of energy issues and causes people to choose more energy efficient options.
- Establish a comprehensive community energy efficiency program to allow local organization and delivery of energy efficiency programs and messages.
- Promote the creation of work hubs and improved public transit in communities to reduce vehicle miles traveled by encouraging communities to use federal stimulus funding available for these activities.
- Seek federal funding to implement auxiliary power units for trucks to reduce unnecessary engine idling.

Buildings like the downtown Newton courthouse, are exploring options to meet goals for energy efficiency to save operating costs and optimize energy in Iowa. ***Photo by Don Tormey.***
OPPOSITE PAGE: An open-air conference room at a downtown Des Moines office. Many offices are exploring funding options to the use energy efficient lighting and improved heating and cooling systems to meet building codes, provide comfort and produce energy savings. IA. ***Photo by IDED/Main Street Iowa.***

KEY PARTNERS

Iowa Utilities Board,
Office of Consumer Advocate,
Iowa Energy Center,
Center for Energy &
Environmental Education,
Department of Economic
Development,
Department of Public Safety,
Iowa Utility Association,
Iowa Association of
Municipal Utilities,
Iowa Association of
Rural Electric Cooperatives,
Iowa State Association of Counties,
League of Cities,
Iowa Community Colleges

3-5 YEAR PLAN HIGHLIGHTS

- *Begin assessment of progress toward meeting the benchmark.*
- *Implement the results of the decoupling committee's findings.*
- *Implement a comprehensive community energy program.*
- *Establish a statewide certification program for energy auditors and energy efficiency equipment installers.*

WORK HUBS – REDUCING VEHICLE MILES TRAVELED IN IOWA

In Iowa people are commuting longer distances to work, many times to work in an office situation where they spend the majority of their time on the phone or computer. While spending more time in the car to and from work can be a personal choice it doesn't have to be the only choice. Well planned use of telecommunication technology can be an alternative to driving many miles. Work hubs established in key areas around the state allow commuters to drive shorter distances to work while still conducting the necessary daily activities for many jobs.

Through the development of better telecommunication and smart grid technology, work hubs will become more feasible and practical. The development of work hubs will not only save the citizens of Iowa money and time, it will help reduce vehicle miles traveled and the use of petroleum based transportation fuels.

Bob Grugal, a new resident to Iowa from Michigan, exits from the inside a giant wind turbine blade which he helps produce at TPI Composites plant in Newton. With the help of the Iowa Power Fund, this facility has provided numerous jobs in the central Iowa area, many hired locally from Newton. ***Photo by Don Tormey***

TPI Wind Turbine Blade manufacturing NEWTON

Bob Grugal used to make boats in Michigan. Now he's sailing on a new kind of vessel: giant, 40-meter-long blades for wind turbines produced in Newton, Iowa.

"America has gone green and I want to be a part of that," said Grugal, who works on the wind blades at TPI Composites, a facility northeast of downtown that's partially supported by Power Fund dollars. Every day, Grugal climbs inside the massive blades to check the seals of the seams, appearing almost microscopic next to the towering slabs of molded fiberglass.

Grugal, who relocated his family to Iowa, is one of about 475 current employees at TPI -- most of who had formerly lost their manufacturing jobs and about 60 percent who are local hires. General Manager Cruger Tuttle said he expects even more employment growth next year, as blade orders spread into several Midwest states and Canada.

"Because of Iowa's investment in wind, and the incentives and assistance of the Power Fund, this is an important part of the energy solution," Tuttle said.

Through improved labor productivity – up to 34 percent – the wind turbines will increase manufacturing and deliver more job opportunities in Iowa.

"If we can cut our link to foreign oil, that is great," Grugal said. *"And wind is an important piece that will help."* ■

RENEWABLE ENERGY GOAL:
FULLY DEVELOP IOWA'S RENEWABLE ENERGY POTENTIAL

Iowa has abundant clean energy resources that make our state a natural for establishing a truly unique clean energy economy. Iowa continues to increase its capacity as a leader in the wind industry with a goal to be the first in the nation to fulfill our contribution to the 20% by 2020 National Wind Power objective.

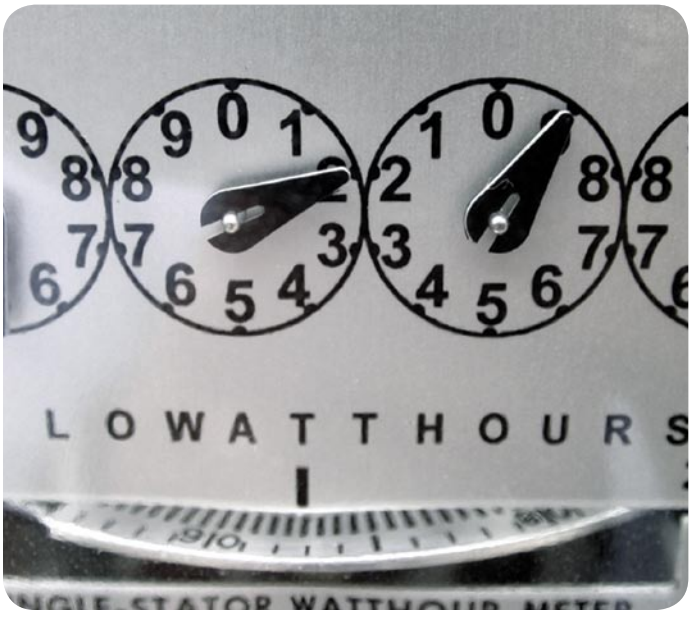
Iowa is second in the nation in installed wind capacity, and we have only just begun to develop this clean and abundant resource. Key to development efforts are workforce education and training that will continue to create new green collar jobs that cannot be outsourced.

THE OFFICE OF ENERGY INDEPENDENCE RECOMMENDS THE FOLLOWING STRATEGIES TO MEET OUR GOAL:

- Ensure adequate transmission capacity development to enable Iowa to move large quantities of wind energy both within the state and to out-of-state load centers.
- Promote smart grid development and deployment
- Increase distributed generation with renewables.

IN THE NEXT YEAR, THE OFFICE OF ENERGY INDEPENDENCE RECOMMENDS THE FOLLOWING ACTIONS:

- Continue active engagement in national, regional and sub regional transmission planning efforts.
- Coordinate efforts with Northeast states to enhance transmission development from the Midwest to the East coast through the Governor's Wind Energy Coalition.
- Learn about and employ smart grid technologies to encourage alternative rate structures, support advanced meter infrastructure, and technology demonstrations.



- Support the establishment of state-wide interconnection standards, including supporting the Iowa Utility Board's rule making process for interconnection standards.
- Provide financial support for research and development, early commercialization and technology demonstrations of distributed generation.
- Collaborate with industry, associations, and state agencies to develop certification for a photovoltaic and wind workforce.

ENERGY "MADE IN IOWA"

When people think of clean, cost competitive, renewable energy the next thought should be "Made in Iowa".

Today we are building the infrastructure necessary to make this vision a reality. Iowa has caught the attention of some of the world's best energy companies and researchers. They come to Iowa for the quality of life, the intellectual and physical infrastructure, funding opportunities, and for the variety of energy and manufacturing companies located in the state. Iowa has solidified its reputation of being an energy research and development center for the nation and we have some of the world's best energy researchers at our state's universities. Within all of this, we are creating an energy industry backbone that can make Iowa the one place where the new clean energy economy can thrive.

One important part of developing the energy economy of the future is maintaining the Iowa Power Fund. The Power Fund provides up to $25 million dollars a year to fund research and development, early stage commercialization, and education. With this committed investment on the part of the state, our researchers, manufacturers, and developers are much better equipped to compete for scarce investment dollars to build the "Made in Iowa" new clean energy economy.

Scientist Keqin Han, whose position was provided by the Power Fund, performs light research testing on solar cells at Iowa State University and the Microelectronics Research Center. *Photo by Don Tormey.*

KEY PARTNERS

Iowa Utilities Board, Midwest Independent System Operator, Upper Midwest Transmission Development Initiative, Eastern Interconnect State Planning Council, Federal Energy Regulatory Commission, National Association of Regulatory Utility Commissioners, Governors Wind Energy Coalition, Midwest Governor's Association, Iowa Utilities, Iowa Department of Natural Resources, Iowa Community Colleges, IA WIND, CEEE, IRENEW

3-5 YEAR PLAN HIGHLIGHTS

- Cost allocation for transmission development resolved
- Widespread smart grid adoption allowing full integration of wind energy into the transmission grid
- Widespread use of smart grid adoption on the customer side of the meter optimizing energy use
- Increased use of clean, distributed generation technology
- Established knowledgeable workforce and consumer-base for the new green economy

Workers at the growing TPI Composites plant in Newton are surrounded by giant wind turbine blades in production as they take measurements on a new blade in the process. With the aid of the Iowa Power Fund, this large operation has provided hundreds of new green jobs to help power the wind generating industry. ***Photo by Don Tormey.***

BIOFUELS GOAL:

OPTIMIZE THE DEVELOPMENT AND USE OF ECONOMICALLY AND ENVIRONMENTALLY SUSTAINABLE LOW CARBON FUELS.

Rapid change in economic conditions and government policy surrounding the biofuels industry has created the need to bolster the industry's economic and environmental viability. With low carbon fuel standards pending in various states and on a federal level, it will become increasingly more important to support current, first-generation biofuels, but also to accelerate the development and commercialization of second-generation technology. The biofuels industry has helped create and retain green jobs in Iowa and has helped revitalize our rural economy. Iowa's abundant biomass resources and skilled workforce give Iowa a distinct competitive advantage for expanded future biofuels development.

THE OFFICE OF ENERGY INDEPENDENCE, IN COLLABORATION WITH INDUSTRY LEADERS, WILL WORK TO ENHANCE THE LONG-TERM ENVIRONMENTAL AND ECONOMIC VIABILITY OF THE INDUSTRY THROUGH:

- Refueling infrastructure development, education, promotion and support for mid- to high- level biofuels blends.
- Infrastructure development to ensure an adequate biomass feedstock supply for second generation biofuels.

IN THE NEXT YEAR, THE OFFICE OF ENERGY INDEPENDENCE RECOMMENDS THE FOLLOWING ACTIONS:

- Working with the Governors' Biofuels Coalition to:
  - *Advocate for increased funding for infrastructure development.*
  - *Work with automakers for the promotion of renewable fuel technologies.*
  - *Encourage U.S. Department of Energy and Environmental Protection Agency to support mid- to high- level renewable fuel blends.*
- Develop a sample policy for providing renewable fuels to government and corporate fleets.
- Resolve biofuels coding issues, to make monthly tracking for state government and other fleets easier.

- Deliver an overall energy message that will include a renewable fuels education component to explain the economic, environmental, and energy security benefits of its use.
- Identify methodologies and technologies for tracking and distribution, such as GPS trackers, to increase consumption of renewable fuels
- Foster relationships at the federal level to increase funding for pilot projects related to infrastructure build out.
- Continue to identify and solicit U.S. Department of Energy, Department of Agriculture, and Environmental Protection agency programs to implement a city-to-region approach to infrastructure development.
- Develop a biomass feedstock supply infrastructure and provide support for integrated biorefineries by:
  - *Providing financial support and promoting cost-sharing of federal funds for research and development of harvesting, storage, and transportation (HST) systems and biomass crop production.*
- Capture all the efforts and facilitate communication between researchers through a Biomass Council on Research and Development.
- Work with Power Fund applicants to find additional funding sources and offer quarterly workshops for potential Power Fund applicants.
  - Promoting and supporting technology development and deployment for lifecycle greenhouse gas (GHG) emissions reduction for all biofuels.
- Coordinate Iowa's initiatives and participate in discussions about a federal low carbon fuel standard, including the development of a model for actively measuring lifecycle carbon emissions for all fuels
- Find and create financing options for producers to reduce their environmental impact and optimize their energy use.

POET General Manager Daron Wilson, takes a sample of 200-proof ethanol from inside the Emmetsburg facility's testing area. In addition to being a high producing corn ethanol plant, the facility is using Power Fund dollars to help "bolt on" the new technology needed to produce cellulosic ethanol. Key objectives of Project LIBERTY are to validate the technology and economics at commercial scale and enable replication at other biorefineries in Iowa and across the country.
OPPOSITE PAGE: Lifetime West Bend farmer Lannie Miller drops a load of corn at the POET Biorefinery plant in Emmetsburg, Iowa. ***Photos by Don Tormey.***

KEY PARTNERS:
Iowa Department of Economic Development,
Iowa Department of Agriculture and Land Stewardship,
Iowa State Association of Counties,
Iowa League of Cities,
Iowa Renewable Fuels Association,
Iowa Department of Public Safety,
Iowa Clean Cities,
Iowa Biodiesel Board,
Iowa Soybean Association,
Iowa Corn Growers Association,
Iowa Farm Bureau,
Environmental Groups,
Iowa Department of Transportation,
U.S. Department of Agriculture – Rural Development,
Petroleum Marketers and Convenience Stores of Iowa,
Iowa Economic Development Groups – Local Chambers of Commerce,
Iowa Regents Institutions,
BioCentury Research Farm,
University Extension offices,
Iowa Association of Rural Electric Cooperatives,
Iowa Community Colleges

3-5 YEAR MILESTONES:
- Increased renewable fuels infrastructure *– including mid to high level blends*
- Increased consumption of renewable fuels
- Work with corporate and government fleets to enforce renewable fuels use policies
- Full-scale commercialization of biomass HST
- National leadership in methodology and systems approaches for biomass HST
- Significant development of intellectual property and job creation measurements for Iowa's bioeconomy

PROJECT **LIBERTY**

Emmetsburg POET Biorefinery Plant

The one-of-a-kind biorefinery plant in Emmetsburg is doing much more than turning corn and cellulose to ethanol.

It's also fueling job growth, farming, transformational research and, confirms longtime resident Lorrie McNally, donut sales.

"The plant brings more people into town," says McNally, a 35-year resident and former owner of the McNally Bakery just off Main Street. "Farmers and truckers stop to have coffee, donuts or lunch; it's good for us and the economy . . . so I love it."

Project LIBERTY at POET, as it's called, is putting Power Fund dollars to work on research and technologies that will help advance the country toward its biofuels mandate and reduce dependence on foreign oil.

Feedstock for the cellulosic portion of the biorefinery is a mix of corn fiber from the corn kernel and cobs, which are harvested using special cob harvesters. The technology has spurned growth among famers – including POET Commodity/Biomass Manager B.J. Schany, who returned to Emmetsburg from out of state specifically for opportunities at the biorefinery.

In addition to working at POET, Schany farms nearby with his brother, helping to build relationships with local farmers to help scale up the production process and mounting need for more cobs – up to 700 tons per day. The plant will create about 100 new full-time jobs and as many as 200 part-time farm related employment opportunities.

Lannie Miller, a lifelong West Bend farmer who recently unloaded his semi-truck of corn at the plant said: "I'm semi-retired, but if they want corn and now my cobs too, I'm more than ready to do that!" ■

Looking north from a freshly plowed corn field, a combine passes a giant pile of corn cobs harvested for storage and testing at the Emmetsburg plant, background. Leading a tour of the facility, General Manger Daron Wilson explains how Project Liberty will help in the transformation of the traditional ethanol biorefinery in Emmetsburg into an integrated corn-to-ethanol and cellulose-to-ethanol operation. ***Photos by Don Tormey.***

Making Iowa's Cities Sustainable

THE FAIRFIELD MODEL FOR ENERGY SECURITY AND ECONOMIC VIABILITY.

Fairfield is a rural community with surprisingly big-city initiatives: "Going green" means a whole different thing in this Southeast Iowa town.

Look no further than the local radio station, which is totally powered by an array of solar panels. Nearby, the Maharishi University of Management uses solar technology and showcases the Eco-Abundance Village of 15 homes that use wind, solar and other renewable power sources in everyday living. Just northwest, a wind turbine and more than 80,000 square-feet of greenhouses help produce a wide variety of fresh, organic produce.

And nearly 75 homes in Fairfield already are using renewable energy features.

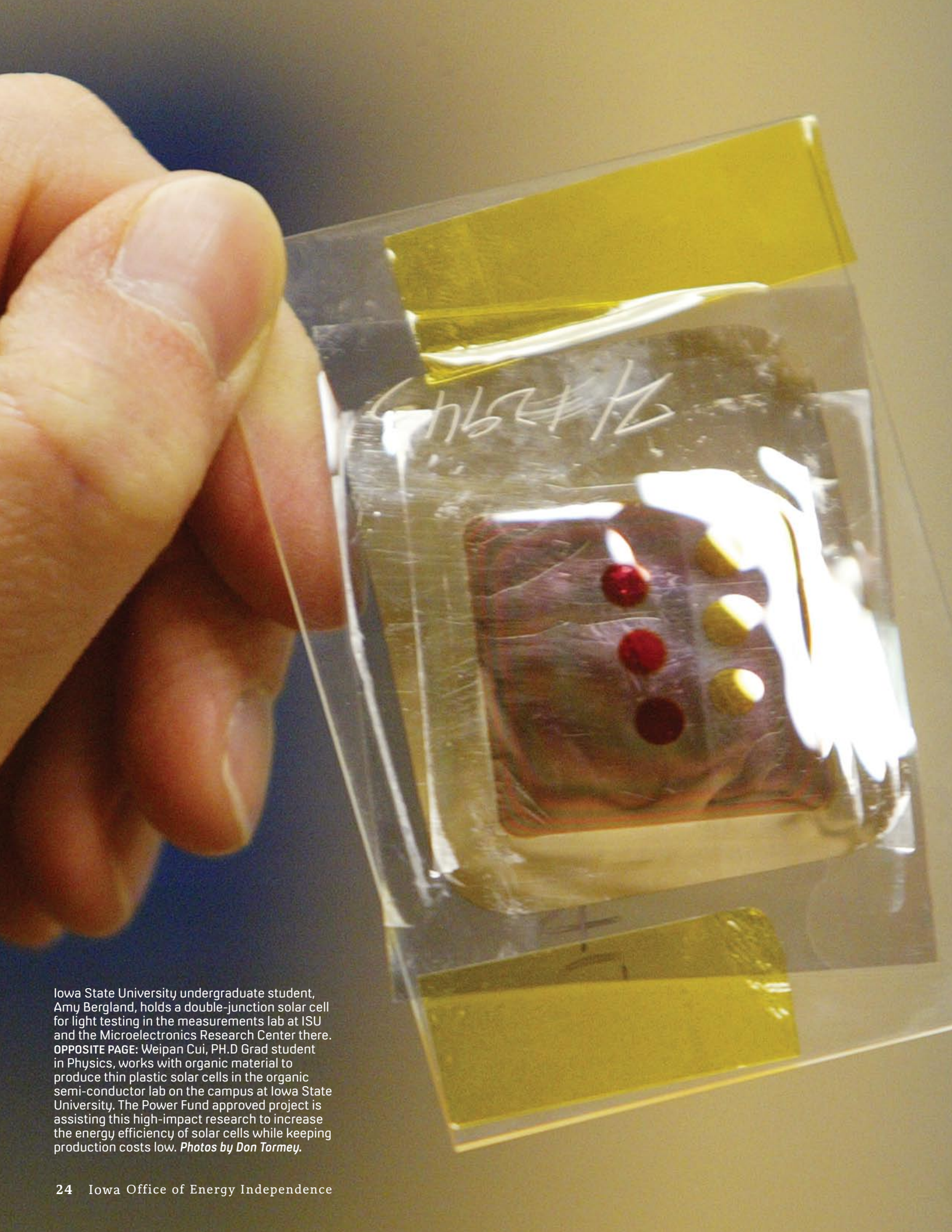
"At this time in history, energy independence and sustainability is the biggest story in Iowa and we have the chance to be a leader in the nation," says Scott Timm, sustainability coordinator for the office of Community Economic Development in Fairfield. "Opportunities are here now for the creation of green jobs...and it's already happening in Fairfield."

Support from the Power Fund has established the "Fairfield Model" of integrating grassroots initiatives with formal city planning to address the full range of sustainability issues – including power, housing, transportation, industrial processes, waste management and food.

The community-based enthusiasm is evident all around Fairfield. Mayor Ed Malloy has sent copies of the plan to more than 100 mayors across the state, to help stimulate and coordinate action.

Says Malloy: "We must continue to change the culture with education toward more energy efficiency and alternative energy resources." ■

Stuart Valentine, local Fairfield "Go Green" commission member, stands among the football-sized green houses growing organic produce just north of downtown Fairfield. Along with numerous local government and business leaders, Valentine is one of many advocates for energy independence and sustainability. **OPPOSITE PAGE:** Solar panels line the street near downtown Fairfield. These panels totally power the local radio station and this rural community in Southeast Iowa is demonstrating efforts for energy security and economic viability by becoming a model city for sustainability. ***Photos by Don Tormey.***



Iowa State University undergraduate student, Amy Bergland, holds a double-junction solar cell for light testing in the measurements lab at ISU and the Microelectronics Research Center there. **OPPOSITE PAGE:** Weipan Cui, PH.D Grad student in Physics, works with organic material to produce thin plastic solar cells in the organic semi-conductor lab on the campus at Iowa State University. The Power Fund approved project is assisting this high-impact research to increase the energy efficiency of solar cells while keeping production costs low. ***Photos by Don Tormey.***

AMES, IOWA STATE UNIVERSITY

Efficient, Low Cost Photovoltaic Solar Energy Conversion

In small laboratories and even smaller rooms, they manipulate, evaluate and investigate tiny solar cells on plastic that have the potential for huge energy changes in our world.

Graduate and doctorate students work feverishly on organic material that will increase the efficiency of solar cells on plastic, one-inch squares; light testing that will measure double-junction solar cells and push them to work harder; and a new "Sputtering Reactor" that painstakingly deposits contacts on solar cells.

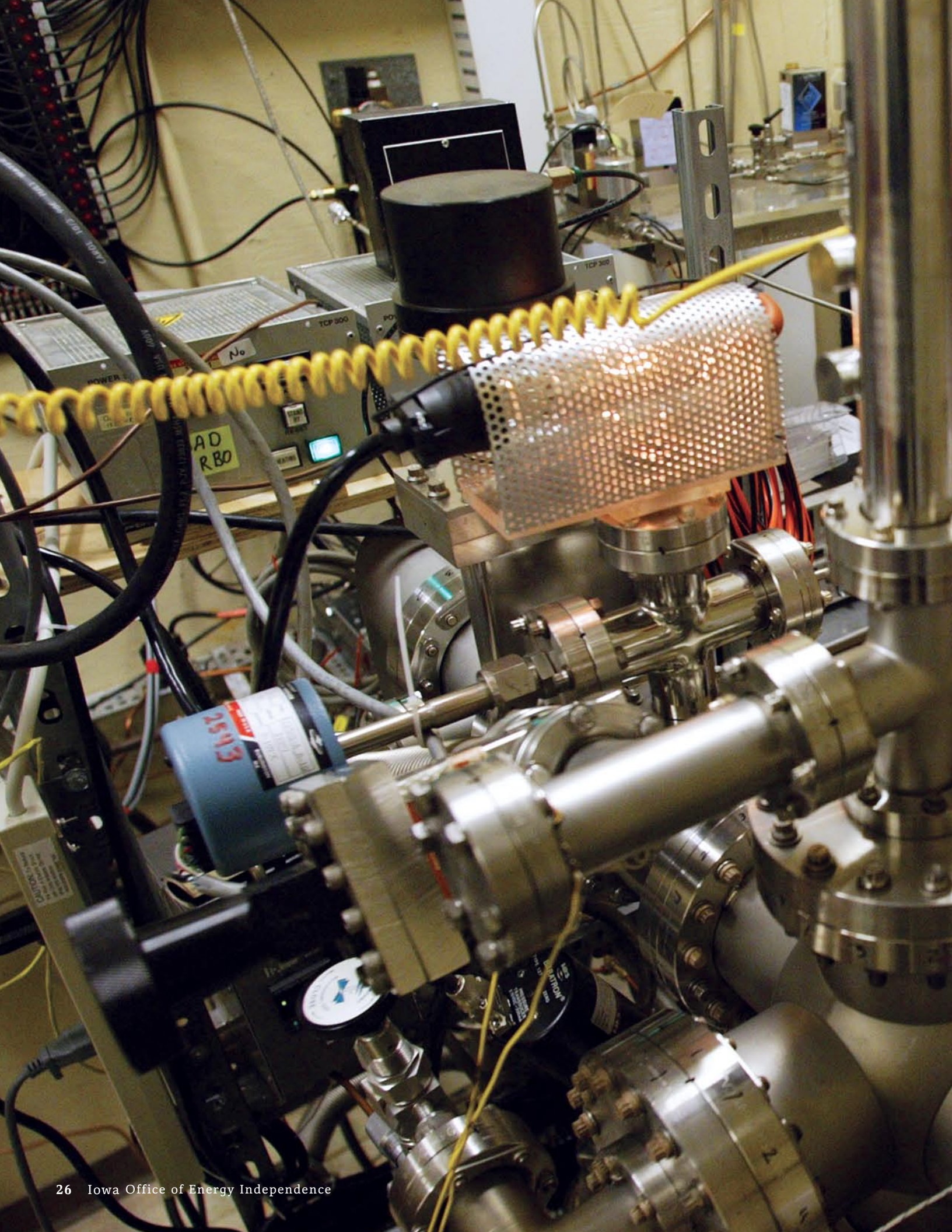
The work is both microscopic and monumental, says Dr. Vikram l. Dalal, director of the Microelectronics Research Center at Iowa State University – a fireball of energy whose wealth of technical knowledge has propelled the assembly of research for the development of efficient, low-cost photovoltaic solar energy conversion.

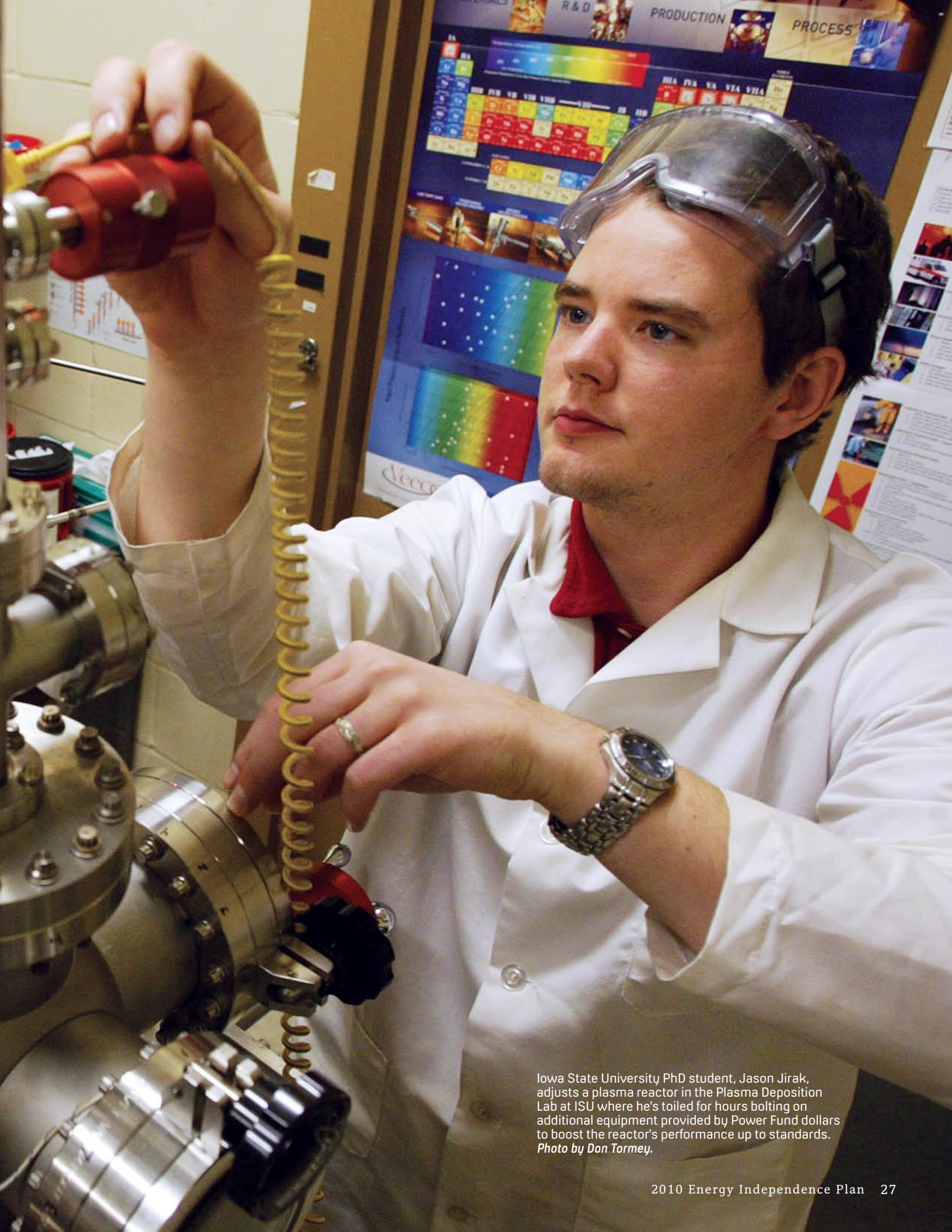
"The important work performed here could not be to the level it needs to without the assistance of the Iowa Power Fund," says Dalal, department chair of the Institute for Physical Research and Technology at ISU. "It has provided a catalyst and will speed the development and process of plastic solar cells with a goal of a 9-10% increase in efficiency."

Power Fund support has enabled Dalal to purchase high-tech equipment and lead an exceptional R&D team that includes highly-qualified campus faculty and students.

The impact of this research won't take long to realize, according to Dalal. In fact, within three to five years, it could easily be applied in commercial and residential construction – as well as plug-in hybrid vehicles. A relative few new jobs now has the potential to blossom into numerous green jobs of the future.

"I can see a breakthrough." ■





Iowa State University PhD student, Jason Jirak, adjusts a plasma reactor in the Plasma Deposition Lab at ISU where he's toiled for hours bolting on additional equipment provided by Power Fund dollars to boost the reactor's performance up to standards. ***Photo by Don Tormey.***

Green Plains Renewable Energy and Bioprocess Algae, LLC project

SHENANDOAH

Like something straight from a science fiction film, new 'green technology' is growing in large vertical tubes at an ethanol facility in rural Shenandoah - algae. The process uses advanced photo bioreactor technology producing the algae at this pilot plant.

The Green Plains Renewable Energy and Bioprocess Algae, LLC project addresses the affordable feedstock availability for the biofuel industry. With Iowa Power Fund dollars, the project will use breakthrough technology developed for the mass production of a non food vs. fuel feedstock – the algae. The inputs for the mass production of this natural product are sustained by the waste products; carbon dioxide, recycled heat and water.

At the Shenandoah Sanctuary Restaurant coffee club, discussion flows like the java and algae is a hot topic. "Shenandoah has always had a can-do attitude for economic development", says Bob Norris, "working with local government and the stimulus provided by the Iowa Power Fund is another great example of short-term innovative goals and ideas for long-term growth." Others like Al Rhude chimed in stating, "The advantage of the algae project is the potential for jobs to keep younger workers and families in rural towns, all we needed was the seed money." He went on, "The Power Fund has been a great shot in the arm for that."

Tucked off to one side of the plant, BioProcess Algae Chief Scientist John Haley and Shawn Kitchner were 'harvesting' algae bottling and marking samples of the green liquid. Haley, the inventor, still gets excited at the process, "We knew it worked, but these results are very promising in this industrial environment, the next phase will be to ramp up the scale even larger."

Former mayor and economic development advocate Greg Connell sees the big picture for the project and Shenandoah's future. He envisions algae farms employing up to 50 new positions and potentially, 'up to a thousand new jobs' in the manufacturing and assembling of the bioreactors in the area.

Local government officials agree. "We're very excited about the project and a chance to lead the nation in this – we want the bragging rights," Bo Harris, city administrator. He went on, "This project is great for the environment, it will help Iowa become less dependent on foreign energy, expand jobs and generations will benefit." Longtime city councilman Marvin Adcock said, "It's the most exciting project since I've been on the council and has the potential to put Shenandoah on the map." ■

Multi-colored LED lights illuminate large vertical tubes to assist in the growing of algae in Shenandoah, Iowa. The Green Plains Renewable Energy and Bioprocess Algae, LLC project addresses the affordable feedstock availability for the biofuel industry. ***Photo by Don Tormey.***

BioProcess Algae LLC. Engineer Shawn Kitchner, adjust controls on the large vertical tubes used to grow and harvest algae inside the Green Plains Renewable Energy ethanol plant in Shenandoah, Iowa. ***Photo by Don Tormey.***

AMERICAN RECOVERY & REINVESTMENT ACT OF 2009

The American Recovery and Reinvestment Act (Recovery Act) was signed into law in February 2009 and is an opportunity to enhance its existing energy programs and spur greater economic development in Iowa's energy industry. The Recovery Act provides funding to the state through the following energy programs: *State Energy Program (SEP), Energy Efficiency and Conservation Block Grants (EECBG), and State Energy Efficient Appliance Rebate Program (SEEARP).*

STATE ENERGY PROGRAM – **SEP**

The Office received approximately **$40.5 million** for Iowa's State Energy Program. The goal of the State Energy Program funding is to help reduce per capita energy consumption by at least 25% of the state's 1990 per capita energy use by 2012. The Office expects to leverage an additional investment of over $100 million through the projects funded in this category.

ENERGY EFFICIENCY AND CONSERVATION BLOCK GRANTS – **EEGBG**

The Office will receive approximately **$9,593,500** for its Energy Efficiency & Conservation Block Grants Program. The goal of the funding is to assist state and local governments in implementing strategies to reduce fossil fuel emissions, to reduce total energy use, and to improve energy efficiency.

STATE ENERGY EFFICIENT APPLIANCE REBATE PROGRAM – **SEEARP**

Through the American Recovery and Reinvestment Act, the Office will receive approximately **$2.8 million** for its State Energy Efficient Appliance Rebate Program. The funds are designated for the purpose of saving energy by encouraging appliance replacement through consumer rebates.

WHAT ABOUT BASELOAD POWER?

Iowans must have reliable, constant power to meet our minimum load requirements.

For the foreseeable future, this means fulfilling our state's needs through efficiency, renewable energy and the cleanest and most efficient traditional generation sources available.

Cover photo by Clay Smith, Iowa DNR.
Back cover photo by Don Tormey.

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